American University-Central Asia

SYLLABUS
DISCRETE MATHEMATICS AND MATHEMATICAL LOGIC – II
(COM 228, CID 3130)

Required and recommended for the students of "Applied Mathematics and Informatics" and "Software Engineering"
Spring 2016 (January 18 – May 6)

1. **Instructor:**
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2. **Consultations:** according to the preliminary arrangement with instructor.

3. **Volume of academic load:** 2 classes per week (one lesson = 75 minutes), 15 working weeks, total 6 credits.

4. **Brief course description:** Course is focus on a base concepts and techniques of discrete mathematics; second part of this course contains the following topics: fundamentals of logic, principles of counting, graph theory and Boolean algebra.

5. **Objectives:** Course has more than one purpose. It provides the mathematical foundations for many computer science courses, including data structure, algorithms, database theory, formal languages, compiler theory, computer security, and operating systems. More importantly, course should teach students how to think mathematically, that is, to develop ability to understand and create mathematical arguments.

6. **Prerequisites:** COM 227 (COM 225).

7. **Textbooks:**

1. Kenneth H. Rosen. Discrete Mathematics and Its Applications. WCB/McGraw-Hill, Sixth Edition, 2007.

2. Abraham P. Hillman, Gerald L. Alexanderson, Richard M. Grassl. Discrete and Combinatorial Mathematics. Dellen Publishing Company, 1987.

8. **Requirements and knowledge evaluation:**

Grading

Grades will be based on a total of 100 points, coming from**:**

Quiz 1	The instructor sets day and time	10 points
Midterm Exam	The instructor sets day and time	25 points
Quiz 2	The instructor sets day and time	10 points
Project	The instructor sets day and time	10 points
Homework and class activity	Every class	10 points
Final Exam	Office of the Registrar sets day and time	35 points

The final grade of the student will calculated in conformity with a following scale:

$0 \le F \le 40 < D \le 45 < C- \le 50 < C \le 60 < C+ \le 65$
$65 < B- \le 70 < B \le 80 < B+ \le 85 < A- \le 90 < A \le 100$.

Make-up Exams and Quizzes

- If the reason for missing any exam or quiz is not valid, then the grade 0 will be given for the missing exam or quiz.

- If a student misses both exams, he/she will not be attested for the course.
- If the reason for missing the midterm exam is valid, the student's Final Exam will be worth up to 50 points. In this case, extra tasks will be included in the Final Exam.
- If the reason for missing the Final Exam is valid, the student can apply for the grade of "I".

Attendance Requirements

It is important to attend classes to master the materials in the course. Attendance affects grades: students lose 1 point for any unexcused absence. Missing 10 or more classes for any reasons will result in a grade of F in the course.

Academic Honesty

The Mathematics and Natural Sciences Department has zero tolerance policy for cheating. Students who have questions or concerns about academic honesty should ask their professors or refer to the University Catalog for more information.

Cell phones

We ask students to turn off their cell phones during math classes. Use of cell phones is entirely prohibited during the exams.

Syllabus change

Instructors reserve the right to change or modify this syllabus as needed; any changes will be announced in class.

9. Course content and tentative academic calendar:

Weeks 1-8

The Language of Logic / [1]: P. 1-37; [2]: P.147-177/.

- ☞ Propositions and truth tables. Propositional equivalences.
- ☞ Predicates and quantifiers.
- ☞ Translating sentences into logical expressions.
- ☞ Proof methods.

Combinatorics (Counting) / [1]: P. 232-260; [2]: P.210-245/.

- ☞ The fundamental counting principles: Addition Principle (the Sum Rule), Multiplication Principle (the Product Rule), Inclusion-Exclusion Principle.
- ☞ Permutations and combinations.
- ☞ The binomial coefficients and Pascal's triangle. The binomial theorem.
- ☞ Permutations and combinations with repetitions.
- ☞ Generating functions and combinations.

Week 10 (March 21-25) Spring break

Weeks 9,11-16

Graph theory / [1]: P. 438-501, P. 528-546; [2]: 293-335/.

- ☞ Types of graphs. Graph terminology.
- ☞ Some applications of graphs.
- ☞ Representing graphs. Adjacency matrices. Incidence matrices.
- ☞ Isomorphism of graphs.
- ☞ Connectivity. Connectedness in directed and undirected graphs.
- ☞ Euler and Hamilton paths.
- ☞ Shortest path problems.
- ☞ Introduction to Trees.
- ☞ Applications of Trees.

Boolean Algebra / [1]: P. 593-611; [2]: P. 93-129/.

- ☞ Boolean expressions and Boolean functions. Representing Boolean functions.
- ☞ The abstract definition of a Boolean algebra.
- ☞ Examples of Boolean algebra.
- ☞ Applications of Boolean algebra. Logic Gates.